Josh A. Cohen (SBN 217853)
CLARENCE DYER & COHEN LLP
899 Ellis Street
San Francisco, CA 94109
Tel: (415) 749-1800
Fax: (415) 749-1694
jcohen@clarencedyer.com

Shawn Halbert (SBN 179023)
214 Duboce Ave.
San Francisco, CA 94103
Tel: (415) 703-0993
Fax: (415) 255-8631
shawn@shawnhalbertlaw.com

Attorneys for Defendant
REGINALD ELMORE

IN THE UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTRICT OF CALIFORNIA

SAN FRANCISCO DIVISION

UNITED STATES OF AMERICA,
 	
       Plaintiff,
 	
   v.
 	
ALFONZO WILLIAMS et al.,
 	
       Defendants.
	CASE NO. CR-13-0764 WHO
	
	DEFENDANT ELMORE'S REPLY BRIEF IN SUPPORT OF MOTION TO EXCLUDE OPINIONS OF SERI FORENSIC SEROLOGIST PHILLIP HOPPER REGARDING DNA EVIDENCE
	
	Hearing Date: April 22, 2019

INTRODUCTION

The government's opposition to Mr. Elmore's *Daubert* motion only underscores the fundamental problem with the opinions in SERI's February 2018 report: SERI cannot apply Bullet to the mixture from the right door handle given the limits of Bullet's validation, because SERI cannot say that the mixture contained four or fewer contributors. This is no mere foot fault; it is not a "minor flaw in an expert's reasoning or a slight modification of an otherwise reliable method." Opp'n at 7. Rather, as PCAST, SWGDAM, and the United States Supreme Court agree, it is a fundamental failure of validation that renders Mr. Hopper's conclusion speculative, unreliable, and inadmissible in a court of law.[1]

ARGUMENT

The issue here is straightforward. SERI can only apply Bullet to two-person, three-person, or four-person mixtures, because those are the only kinds of mixtures for which Bullet was validated by SERI. Mr. Hopper knew that, which is why he "assumed" that the mixture from the right door handle contained the DNA from exactly four contributors. However, (1) Mr. Harmor and Mr. Hopper agree that the mixture actually contained the DNA from four *or more* contributors; (2) SERI has never, in a controlled setting, successfully distinguished between a five-person mixture and a four-person mixture; and (3) research shows that, across all labs, a significant percentage of known five-person (and six-person) mixtures are mischaracterized as four-person mixtures. For all of these reasons, Mr. Hopper cannot reliably "assume," as he did

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[1] *See* PCAST, *An Addendum to the PCAST Report on Forensic Science in Criminal Courts* 9 (2017) ("When considering the admissibility of testimony about complex mixtures (or complex samples), judges should ascertain whether the published validation studies adequately address the nature of the sample being analyzed (e.g., DNA quantity and quality, number of contributors, and mixture proportion for the person of interest)."); SWGDAM Guidelines for Validation of Probabilistic Genotyping Systems § 4.1.6.3 ("The number of contributors evaluated should be based on the laboratory's intended use of the software. A range of contributor numbers should be evaluated in order to define the limitations of the software."); *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 590 (1993) ("Proposed testimony must be supported by appropriate validation – *i.e.*, 'good grounds,' based on what is known.").

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1   when he utilized Bullet, that the mixture at issue was in fact a four-person mixture – and his use of

2   Bullet to analyze the mixture thus exceeded the contours of SERI's validation.

3   None of the arguments the government raises in its opposition cures this fundamental

4   failure.

5   **1. "At Least" Is Not Boilerplate**

6   The government first seeks to minimize the significance of Mr. Hopper's conclusion that

7   the "DNA recovered from the Right Door Handle Swabs (items 2-1 and 2-2) is a mixture of *at*

8   *least* four contributors." In the government's telling, Mr. Hopper used the phrase "at least" as a

9   matter of "prudence" given the existential reality that "certainty is impossible." *Id.* What Mr.

10   Hopper really meant, says the government, is that "the data give no indication that there are more

11   than four contributors to the sample in question." *Id.*

12   There are several problems with the government's spin. First, the qualifier "at least" is

13   more than boilerplate; it is grounded in the well-accepted proposition that "the more individuals

14   present in a mixture, the more likely it is the mixture will hide indications of subsequent

15   individuals." Krane Decl. ¶ 12. As a result, complex mixtures may appear, based on allele-

16   counting alone, to contain fewer individuals than they actually contain. *Id.* This is not just a

17   metaphysical conceivability; it is a scientific fact.

18   Second, Mr. Hopper's assertion that "the data give no indication that there are more than

19   four contributors" is not the same as an assertion that there *are* four contributors. By restating his

20   conclusion in this fashion, Mr. Hopper simply underscores that he does not know, and hence

21   cannot reliably assume, that this is exactly a four-person mixture. What's more, neither Mr.

22   Hopper nor SERI quantified the uncertainty inherent in the lab's assumption that the number of

23   contributors to the mixture was four and only four (as opposed to five, six, seven, or any other

24   reasonable assumption for the door handle of a rental car). As such, neither the Court nor anyone

25   else can meaningfully assess the probability that this was a four-person mixture rather than a

26   mixture of five or more. *Cf.* John M. Butler, *Advanced Topics in Forensic DNA Typing:*

27   *Interpretation* 10 (2015) ("By operating within validated ranges, uncertainty in measurements

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1   made on evidentiary samples with the technique can be accurately conveyed in laboratory

2   reports.").

3   Third, at SERI, the data *never* give the indication that there are more than four

4   contributors, even when the mixture is known to contain five contributors or more. Krane Decl. ¶

5   16. Given the laboratory's inability to distinguish five-person mixtures from four-person mixtures

6   as reported in its Globalfiler validation – which is the only available evidence of SERI's

7   competence in this area – there is no empirical basis, and no good reason, to accept Mr. Hopper's

8   "considered judgment."[2] *See General Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997) ("[N]othing

9   in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion

10   evidence that is connected to existing data only by the *ipse dixit* of the expert.").

11   At bottom, it is beyond dispute that "SERI cannot determine that the right door handle

12   swabs is a mixture of DNA from only four individuals and <u>not</u> from a mixture of five or more

13   individuals," Krane Decl. ¶ 18, or that it would therefore "be inappropriate to rely upon eDNA

14   Bullet for the purposes of attaching a statistical weight for the inclusion of any individuals as

15   possible contributors to this sample." *Id.*

16   **2. Mr. Harmor Did Not Make a "Mistake"**

17   The government's second argument is an attempt at brute-force reconciliation of two

18   analysts' conflicting opinions. According to the government, when SERI Chief Forensic

19   Serologist Gary Harmor concluded in 2012 that "[t]he genetic marker profile obtained from the

20   DNA on the swabs from the right door handle #11-11 (item 2-1) is a mixture of DNA from *at least*

21   *five* individuals," that was simply a "mistake." Opp'n at 5.

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25   [2] The government and Mr. Hopper suggest that SERI's inability to recognize five-person

26   mixtures in its Globalfiler validation was an artifact of some kind. Opp'n at 6 n.3. Mr. Elmore
     has no idea whether this is true or not – but even if it is, the fact remains that SERI has not

27   demonstrated, in any controlled environment, that it is able to distinguish known five-person
     mixtures from mixtures of four (or fewer) persons.

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1   Again, what really matters for present purposes is not that there were definitely five people

2 in the mixture; what matters is that SERI cannot say that there were four. Still, the circumstances

3 surrounding Mr. Harmor's rescission deserve a moment's reflection.

4   For one thing, Mr. Harmor's report in 2012 was reviewed by a technical reviewer at SERI

5 who signed off on Mr. Harmor's analysis and conclusions – including his conclusion that the

6 mixture on the right door handle was a mixture of "at least five contributors." The reviewer's

7 imprimatur casts serious doubt on Mr. Harmor's present claim that he was simply "mistaken"

8 when he declared five or more contributors. Just as importantly, Mr. Harmor cannot unilaterally

9 rescind that conclusion now. It does not appear from Mr. Harmor's declaration that he consulted

10 his technical reviewer in connection with his purported rescission, let alone that the reviewer

11 endorsed it.

12   Moreover, the conclusion that Mr. Harmor now wishes to rescind has nothing to do with

13 probabilistic genotyping and nothing to do with the difference between the Identifiler and

14 Globalfiler amplification kits. Rather, Mr. Harmor is now claiming that he made a critical mistake

15 in a fundamental aspect of DNA analysis: determining the number of contributors in a mixture.

16   Worse, Mr. Harmor does not attribute his "mistake" to any deficiency in the sample or the

17 methodology that led to his conclusion. Instead, he and the government submit that he made the

18 "mistake" because he "simply was not focused on it." *Id.* This is a deeply troubling proposition.

19 One cannot help but wonder how many other "mistakes" Mr. Harmor has made – and how many

20 defendants are serving prison terms for crimes they did not commit – because Mr. Harmor was not

21 "focused" on the analyses he performed.

22   Further deepening the concern, the government and Mr. Harmor seek to explain away this

23 lack of "focus" by suggesting that "the number of contributors . . . was not relevant to the

24 statistical analysis he performed." *Id.* But this is simply false. Under SWGDAM guidelines, an

25 analyst must declare the number of contributors to a sample as a condition of reporting a combined

26 probability of inclusion (CPI) statistic like the one that Mr. Harmor computed. SWGDAM,

27 *Interpretation Guidelines for Autosomal STR Typing by Forensic DNA Testing Laboratories* §

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4C.6.3 (2017). As such, the number of contributors was not only relevant to Mr. Harmor's CPI calculation, it was a necessary condition of performing it.

Finally, Mr. Harmor did not revisit his conclusion at any time between its issuance in February 2012 and the filing of Mr. Elmore's motion in March 2019.[3] It was not until Mr. Elmore pointed out that SERI did not validate Bullet on five-person mixtures that Mr. Harmor chose to revise his conclusion that the mixture contained five or more contributors in service of the government's opposition.

The government's revisionism does not salvage Mr. Hopper's opinions. But it is shameful all the same.

3. Mr. Hopper's Inability to Assume Four Contributors Is Underscored By Research on Mischaracterization of Complex Mixtures

The government's third line of attack is directed at the research Mr. Elmore cited concerning the frequency with which analysts mischaracterize the number of contributors to complex mixtures. Once again, the government misses the point. Mr. Elmore has not cited the research in an effort to establish that the mixture from the right door handle necessarily contained the DNA of five or more individuals. He has cited the research because it underscores the inability of an analyst in Mr. Hopper's position to correctly say – or, in Mr. Hopper's case, to correctly "assume" – that a mixture contains exactly four contributors.

The proposition that a large percentage of mixtures that analysts describe as four-person mixtures are actually mixtures of five people or more is not a controversial one. Nor, contrary to the government's suggestion, is it undermined by the age of the studies that reported it, the number of loci the studies examined, or the studies' consideration of peak heights. *See* Opp'n at 5 & n.2 (arguing that cited studies are "of limited relevance" for these reasons). In fact, research in this area published just last year, which took into account labs' usage of identification kits that

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[3] This period included a *Daubert* challenge to Mr. Harmor's analysis by co-defendant Charles Heard and an attendant evidentiary hearing in which Mr. Harmor testified under oath. This period also coincided with SERI's decision to join the eDNA "consortium," SERI's validation study of eDNA Bullet, the government's request for retesting of the DNA samples that Mr. Harmor had already tested, and the issuance of Mr. Hopper's report.

tested 21 autosomal loci, revealed that mischaracterization rates go *up*, not down, when peak height information is taken into account. *Compare* Coble et al., *Uncertainty in the number of contributors in the proposed new CODIS set*, 19 FSI: Genetics 207, 208 (2015) (33% of known six person mixtures mischaracterized as three- or four-person mixtures when peak height is *not* considered) *with* Bright et al., *Internal validation of STRmix – A multi laboratory response to PCAST*, 34 FSI: Genetics 11, 21 (2018) (72% of known six-person mixtures mischaracterized as three- or four-person mixtures when peak height *is* considered).

The government attempts to minimize the significance of this research by pointing to one study (cited by Dr. Krane) that "reported that known four-person mixtures were correctly interpreted as such in seventy-six percent of cases studied." Opp'n at 6 (citing Bright). It is questionable whether an error rate of 24% in any study could ever prove the government's point. But in any event, the relevant inquiry is how often analysts correctly interpret *five*-person, not four-person, mixtures. The issue for present purposes is the validity of Mr. Hopper's "assumption" that the mixture on the right door handle contained only four contributors' DNA (rather than five contributors' or more). To make that assessment, one needs to know what percentage of analysts mischaracterize five-person mixtures as mixtures of four persons or fewer. And the answer to that question, from the same study the government cites, is 64 percent. Krane Decl. ¶ 14.

In sum, the empirical research supports the conclusion that SERI cannot determine that the right door handle swabs contain a mixture of DNA from only four individuals and not a mixture of five or more.

4. Because SERI Did Not Validate Bullet on Five-Person Mixtures, Mr. Hopper Cannot Run Bullet on a Five-Person Mixture

Finally, the government tries to suggest that analyzing the mixture as a five-person mixture would not alter Mr. Hopper's ultimate opinion. According to the government, "Hopper has tested how the likelihood ratio at issue changes if he assumes five contributors instead of four" – and while the ratio "decreases by an order of magnitude," Hopper believes the new ratio "continues to provide very strong support for the inclusion of Elmore." Opp'n at 6.

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1   But the lack of validation on five-person mixtures means – by definition – that Mr. Hopper

2   cannot make this assertion. A lab that has not validated a system for a particular use cannot draw

3   conclusions about the results that such a system *might* generate if it *were* validated for that use.

4   *Daubert v. Merrell Dow Pharmaceuticals, Inc. ("Daubert II")*, 43 F.3d 1311, 1316 (9th Cir. 1995)

5   ("Our task then, is to analyze not what the experts say, but what basis they have for saying it.");

6   Krane Decl. ¶ 18. Indeed, Mr. Hopper effectively concedes as much, acknowledging in his

7   declaration that even he "would not formally rely" on the result of his own experiment with a five-

8   person mixture "because SERI has not validated Bullet for use for five-person mixtures." Hopper

9   Decl. ¶ 31.

10   Moreover, the government's sweeping contention that "mistakes in this area most often

11   benefit the suspect" appears to be based entirely on studies involving a different probabilistic

12   genotyping software program. Opp'n at 6. The publications cited by the government in support

13   of this contention involved STRmix, a continuous probabilistic genotyping system that utilizes a

14   Markov chain Monte Carlo algorithm. *Id.* at 7. By contrast, Bullet is a semi-continuous system

15   that, according to the government, applies some other, unspecified algorithm in lieu of MCMC to

16   generated a likelihood ratio. *Id.* at 8 n.6. Given the differences in the systems – and the total

17   dearth of data on the impact of "mistakes" using Bullet – generalizations about the impact of

18   erroneous contributor counts on likelihood ratios computed by other systems are of no utility here.

19   *   *   *   *   *

20   For all of these reasons, Mr. Hopper's opinions are inadmissible. *See Amorgianos v. Nat'l*

21   *R.R. Passenger Corp.*, 303 F.3d 256, 266 (2d Cir. 2002) ("[W]hen an expert opinion is based on

22   data, a methodology, or studies that are simply inadequate to support the conclusions reached,

23   *Daubert* and Rule 702 mandate the exclusion of that unreliable opinion testimony."). There may

24   come a time when SERI is able to distinguish between four- and five-person mixtures, in a case

25   where SERI's analysts agree that the mixture of interest is a mixture of four or fewer persons. But

26   this is neither that time nor that case. For now, given the limits of SERI's validation of Bullet, Mr.

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1   Hopper cannot testify to a likelihood ratio computed on the basis of an assumption about the

2   number of contributors that he cannot say is correct. *See* Krane Decl. ¶ 18.

3   **5.**   **Mr. Hopper's Opinions Are Excludable Under Rule 403**

4   The government gives short shrift to the concerns Mr. Elmore has raised under Rule 403.

5   While the Court need not resolve these concerns to exclude Mr. Hopper's opinions, they are not

6   the trifles the government's opposition makes them out to be.

7   First, it is no answer to Mr. Elmore's concern about the inherently confusing nature of the

8   likelihood ratio to say, as the government does, that jurors will figure it out. Of course that's the

9   hope – but what distinguishes likelihood ratios from typical scientific opinions is that even their

10   proponents acknowledge their tendency to confuse. *See* National Institute of Justice, Forensic

11   Technology Center of Excellence, *Communication of Likelihood Ratios in Accordance with*

12   *SWGDAM Recommendations*, Oct. 18, 2018, at 57, *available at* https://forensiccoe.org/

13   webinar/swgdam-likelihood-ratios/ ("A jury may not see the difference [between correct and

14   incorrect expressions of a likelihood ratio], but it may give them a false understanding."). Indeed,

15   the government's own expert in *this* case – Mr. Hopper – admits that he misstated the meaning

16   and significance of the likelihood ratio in *this* report concerning *this* mixture. *See* Opp'n at 8 n.5

17   ("Hopper accepts this critique [that he expressed the likelihood ratio incorrectly], and has agreed

18   to reword his report[.]"). Mr. Hopper apparently intends to revise his report to correct the error,

19   but if even an "expert" struggles with the ratio, it is fair to wonder how lay jurors are supposed to

20   get it right.

21   Second, the government misapprehends the problems with a likelihood ratio of 270,000

22   and the heuristic Mr. Hopper has applied in an effort to explain its significance. The number itself

23   – 270,000 – is relative. It is large compared to the number 1, but it is extremely small compared to

24   likelihood ratios in the billions, quadrillions, and octillions that probabilistic genotyping programs

25   often return. The number also varies from one probabilistic genotyping program to another,

26   undermining the seeming precision of the tool. *See* Harish Swaminathan et al., *Four Model*

27   *Variants Within a Continuous Forensic DNA Mixture Interpretation Framework: Effects on*

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1   *Evidential Inference and Reporting,* PLoS ONE 13(11) (Nov. 20, 2018), https://doi.org/

2   10.1371/journal.pone.0207599. And SERI's use of a "verbal scale" to tell the jury what to make

3   of the number raises its own host of problems, particularly given the arbitrariness of the scale and

4   its failure to conform to SWGDAM guidelines (and, by extension, Department of Justice

5   requirements).

6   Finally, the government downplays the implications of presenting the jury with two very

7   different conclusions about the same mixture from the same laboratory. While the government

8   has disavowed some of Mr. Harmor's conclusion (the number of contributors), it continues to

9   support the remainder (the opinion that four in seven people are as likely as Mr. Elmore to have

10   contributed to this mixture). The government chalks up the difference between Mr. Harmor's and

11   Mr. Hopper's opinions to "vast" improvements in technology, but that explanation falls short.

12   SERI analyzed the DNA in the same way in 2018 as it did in 2012; the variation in the experts'

13   opinions is unrelated to the amplification kit that was used or the number of loci that were

14   amplified. The chasm between the analysts' conclusions is driven entirely by Bullet – and thus a

15   jury exposed to Mr. Hopper's testimony would be tasked with determining the relative merits and

16   demerits of CPI statistics and likelihood ratios in a case where the government is championing

17   both. The confusion and consumption of time associated with this undertaking counsels strongly

18   for exclusion of Mr. Hopper's opinions.

19   **CONCLUSION**

20   The government is under no obligation to acknowledge that Mr. Elmore did not commit

21   the murders or touch the car in which they occurred. But the government *is* obligated to prove its

22   case without the benefit of unreliable expert testimony that lacks "appropriate validation" – and

23   therefore poses a significant risk of misleading a jury to conclude what it is not true. *Daubert*, 509

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1   U.S. at 590. Mr. Hopper's opinions fail that basic test. The Court should exclude the opinions

2   from trial.

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4   DATED: April 8, 2019   Respectfully submitted,

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6   By _____/s/_____
                                                Josh A. Cohen

7   Shawn Halbert
                                                Attorneys for REGINALD ELMORE

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